Osteosarcoma and malignant fibrous histiocytoma of bone. Diagnostic and therapeutic aspects with special reference to chemotherapy and surgery.

Heeten, Gerard Johan den

SUMMARY

This thesis is composed of seven articles dealing with several diagnostic and therapeutic aspects of bone tumors.

Osteosarcoma and malignant fibrous histiocytoma (MFH) of bone received special attention. These two malignant primary bone tumors have grade of malignancy, predeliction side, and sensitivity to chemotherapy common. As a consequence there are no essential differences in treatment.

Chapter II

Complications of bone biopsies proved rare in a series of 206 bone biopsies performed over a period of 42 months. There were no serious complications with a negative effect on the ultimate course of the disease. Fractures did occur in patients receiving chemotherapy; precisely in this group this possibility should be borne in mind. As expected, open biopsies produced adequate material more often (98%) than did drill biopsies (70%). The choice between the two techniques, however, depends on individual factors.

Chapter III

Once chemotherapy is started it is very important to obtain information on the response of the primary tumor to this treatment, because the principle is that continuation of chemotherapy is not justifiable in the case of tumor progression, when the primary tumor should be resected as soon as possible. Simple conventional X-rays continue to be a useful aid within the range of evaluation methods.

Chapter IV

Malignant fibrous histiocytoma of bone is a tumor first defined as a separate entity in 1972. Little was known about the primary treatment of choice of this tumor, which at that time was usually classified with the osteosarcomas or fibrosarcomas. Seven patients were treated in Groningen between 1977 and 1985; five were given chemotherapy in addition to surgery. Two of these five were treated by primary amputation and survived with a follow-up of 58 and 30 months respectively after diagnosis. The remaining three patients first received chemotherapy, and the tumor response was histologically verifiable. All three showed a complete tumor response (no more viable tumor tissue) and survived with a follow-up of 56, 46 and 25 months respectively after diagnosis. In view of the far less favorable historical survival data (not different from those for osteosarcoma or fibrosarcoma), primary chemotherapy seems the treatment of choice.

Chapter V

Thirty-two patients with an osteosarcoma of the lower extremity (the site of predilection for osteosarcoma) were treated between July 1977 and July 1985. Treatment consisted of a combination of chemotherapy (32 patients) and surgery (29 patients). Nine patients showed metastases at the time of diagnosis. Only one of them died with a follow-up of 62 months after diagnosis. The remaining eight all died within 18 months. Of the 23 patients without metastases at the time of diagnosis, five were for various reasons treated by primary amputation followed by chemotherapy (including high dose methotrexate, HDMTX). All five survived with a mean follow-up of 76 months. The other 18 patients received chemotherapy prior to surgery. Two of them died: one from chemotherapy complications and the other from metastases. The two-year survival in the entire group of patients without metastases at diagnosis was 91% (21/23). The survival in the group available for a five-year follow-up was 85% (11/13). In nine of the 26 patients (35%) with a tumor in the femur surgery comprised local resection and reconstruction using an endoprosthesis. All survived with a mean follow-up of 69 (99-20) months. Our study shows that chemotherapy greatly improves the survival of patients with an osteosarcoma of the lower extremity. In selected cases limb salvage surgery was found to be feasible.

Chapter VI

From the total group of patients with malignant bone tumors (osteosarcoma, chondrosarcoma and malignant fibrous histiocytome of bone) 15 were selected for local resection and reconstruction with the aid of an endoprosthesis. In the end, endoprostheses were implanted in 12 patients. The results of limb salvage operations were satisfactory in this group. The advantages and disadvantages of the endoprosthesis and the complicatins of this therapy in this group of young patients are discussed.

Chapter VII

The literature indicates that both radiotherapy and chemotherapy may weaken bone. In the group of patients with a femoral osteosarcoma treated by chemotherapy, local tumor resection and reconstruction using an endoprosthesis, two sustained a total of four epiphyseal fractures floowing a minimal injury. Careful radiological analysis suggests that the localization is to be sought mainly in the metaphysis. All fractures were successfully treated by conservative measures.

Chapter VIII

In order to gain more insight into the biomechanical aspects of segmental femur resections and reconstructions using an endoprosthesis a mathematical model was used to obtain general information on the most frequently performed femur resections.

Apart from the design data required for a 'unit construction set' endoprosthesis as presented in a thesis by Dr. F. M. van Krieken, it was found that no adequate effect can be expected from muscle transplantations with changed muscle insertion sites in order to strengthen a muscle group injured as a result of a tumor excision.